The Lou Mass Storage System

For safe, long-term data storage, transfer your files to the Lou mass storage system, which allows you to retrieve your stored files quickly and securely whenever you need them.

The Lou mass storage system is an Intel Xeon Gold 6154 "Skylake"-based cluster combined with a Spectra Logic tape storage archive. Lou uses a parallel Data Migration Facility (DMF) system to provide high speed and bandwidth for data transfers between Lou's disks and tapes.

Connecting to Lou

Lou's four hosts, known as Lou front-end systems (LFEs), are designated as lfe[*5-8*].

You can connect automatically to the LFE that has the lowest load by using the "lou" or "lfe" hostnames in your `ssh` command line: `ssh lfe` or `ssh lou.` This behavior is similar to the load balancing process that occurs on the Pleiades front-end nodes (PFEs) when you run `ssh pfe`.

Transferring Files Between /nobackup Filesystems and Lou

The Lustre (/nobackup) filesystems are mounted on the LFEs. To transfer files between your /nobackup filesystem and your Lou home filesystem, use the local file transfer commands `shiftc, cp`, or `mcp`. For example:

```
lfe% cp /nobackup/your_username/filename /u/your_username
```

You can also create a tar file that contains the data in one of your /nobackup subdirectories and then store the tar file in the LFE home filesystem. For example:

```
lfe% cd /nobackup/your_username
lfe% tar cf /u/your_username/mydir.tar mydir
```

Transferring Files from Your Local System to Lou

The hostnames "lou" and "lfe" are aliases, so bbFTP will not work with them. bbFTP will only accept the specific hostnames "lfe[*5-8*].nas.nasa.gov."

Recommended: Use the Shift tool (`shiftc`), which accepts both the alias and specific hostnames: lou, lfe, or lfe[*5-8*]. Shift automatically invokes bbFTP and uses the appropriate hostname.

For more information about transferring files to and from your local system, see Remote File Transfer Commands.

Data Migration Between Disk and Tapes

In addition to 7.6 petabytes of disk space, Lou has 51 LTO-8 tape drives. Each LTO-8 tape holds 12 TB of uncompressed data, for a total storage capacity of approximately 1040 petabytes, or one exabyte (with normal 35% compression). Data migration (from disk to tape) and unmigration (from tape to disk) are managed by the Data Migration Facility (DMF).

Data stored on Lou's home filesystems (on disk) are automatically migrated to tape. Two copies of your data are written to tape media in silos located in separate buildings. When it is

necessary to make room for more data, some files that have been written to tape may have their data "released" from disk. This means that the file is still visible on the filesystem, but the data must be retrieved from tape before the file can be used.

When a file completes writing to tape on Lou, its `ctime` attribute is updated to signal that it is available to be backed up by system software. This should not have an affect on any file transfer applications such as `rsync`.

If you need to retrieve data that is on tape, be sure to unmigrate the data from tape to your home filesystem on Lou before transferring it to other systems.

TIP: If you use the Shift tool (`shiftc`) for file transfers, it will automatically ensure that files on Lou are online before the transfer.
If you are not using Shift, you can use the following DMF commands to retrieve your files from tape:

```
$ dmls -al file1 file2 . . .    # show the status of your files.
$ dmget file1 file2 . . . &     # retrieve your file from tape.
```

At this point, you can start your transfer and the files will transfer as they come online.

WARNING: Do not use the /nobackup filesystems for long-term data storage. As the names suggest, these filesystems are not backed up, so any files that are removed cannot be restored. You should store essential data on more permanent storage devices, such as Lou.
For more tips on how to use the Lou storage systems more effectively, see:

- Portable File Names and Sizes
- Dealing with Slow File Retrieval

Post-Processing Your Data

To perform post-processing tasks on Lou data, use the Lou data analysis nodes, which provide dedicated PBS resources for that purpose.

Post-processing is not permitted on the LFEs. To enforce this, a system monitoring tool called `query_wms` runs on the LFEs and kills any user process that uses more than 1 GB of memory.

Quota Limits On Lou

There are no disk quota limits on your Lou home filesystem. However, there *are* limits on the number of files (inodes):

- 250,000 inode soft limit (14-day grace period)
- 300,000 inode hard limit

To check your quota status and usage on your home filesystem, log into Lou (lfe) and run the `quota -ls` command as follows:

```
lfe% quota -ls
Disk quotas for user username (uid xxxx):
     Filesystem blocks   quota   limit   grace   files   quota   limit   grace
/dev/cxvm/sfa2_s2n
               87422M       0       0             59381   250k    300k
```

See Quota Policy on Disk Space and Files for more information about HECC system quotas.

Article ID: 371
Last updated: 23 Dec, 2020
Revision: 64
Storing Files & Data -> Backing Up Data in the Lou Mass Storage System -> The Lou Mass Storage System
https://www.nas.nasa.gov/hecc/support/kb/entry/371/